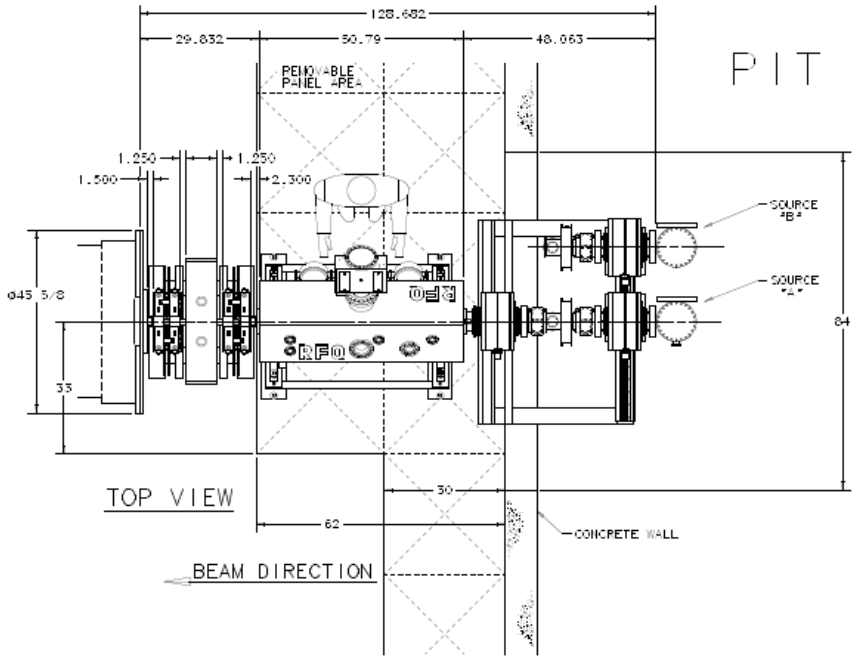
Pre-injector Upgrade Updates (30 Mar 2011 – 13 Apr 2011)

C.Y. Tan
13 Apr 2011

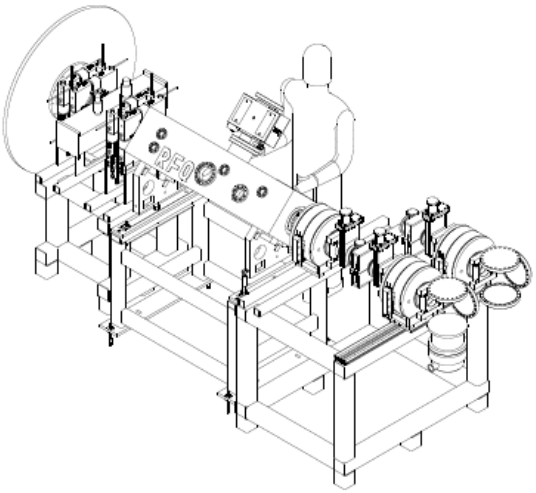
Reminders

- Fill in the MS Project time lines.
- Fill in paper sections for the review.

REV	DESCRIPTION	DRAWN	DATE
		APPROVED	DATE

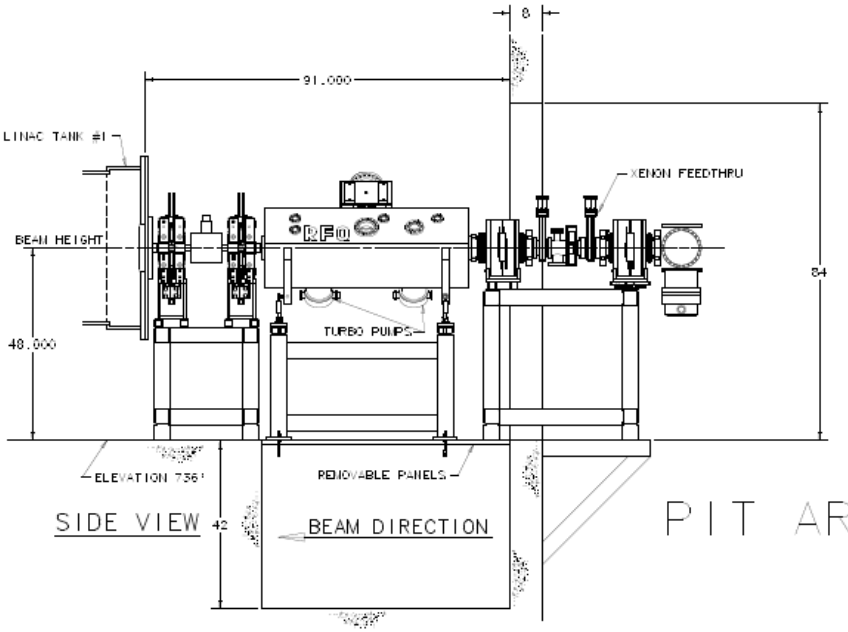


PIT AREA



PREACCELERATOR PRELIMINARY LAYOUT

MARCH 30, 2011



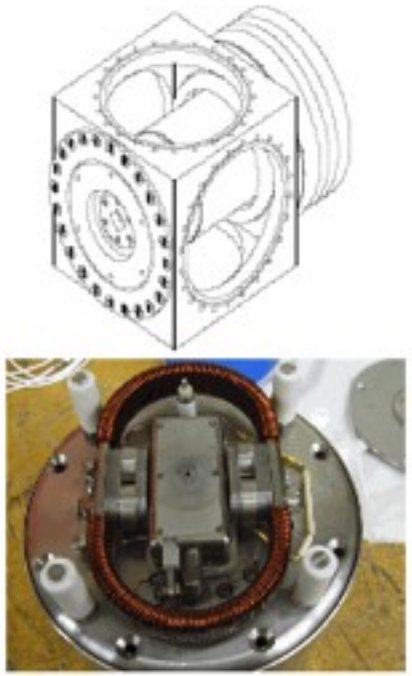
PIT AREA

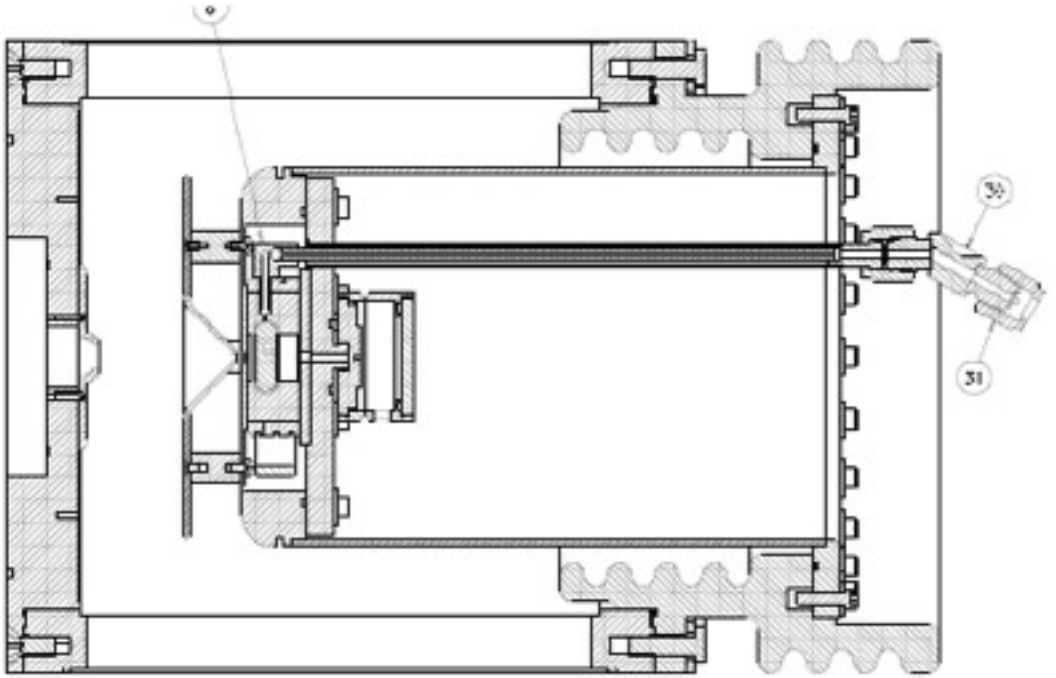
UNLESS OTHERWISE SPECIFIED	ORIGINATOR		
	DRAWN		
± ± ±	CHECKED		
1. BREAK ALL SHARP EDGES (0.)	APPROVED		
2. DO NOT SCALE DRAWING	USED ON		
3. DIMENSIONS & SEE ANSI Y14.5M-1994			
4. MAT'L ALL MACH. SURFACES	MATERIAL		
5. DRAWING UNITS: U.S. INCH			

FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

SCALE	DRAWING NUMBER	SHEET	REV
	. – –	1 OF 1	
CREATED WITH :	GROUP:		

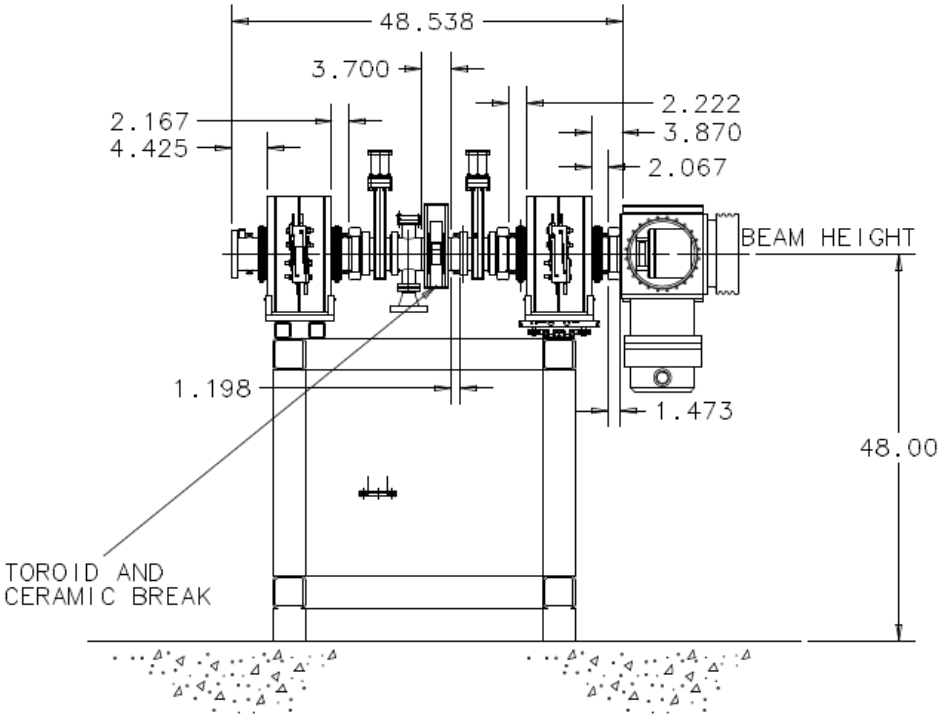
Source Status





Device	Status	Comments
Source	Drawings completed.	Machine shop has drawings. Manufacturing has started.
Water	I- water tapped off (07 Mar 2010)	See next talk

LEBT Status

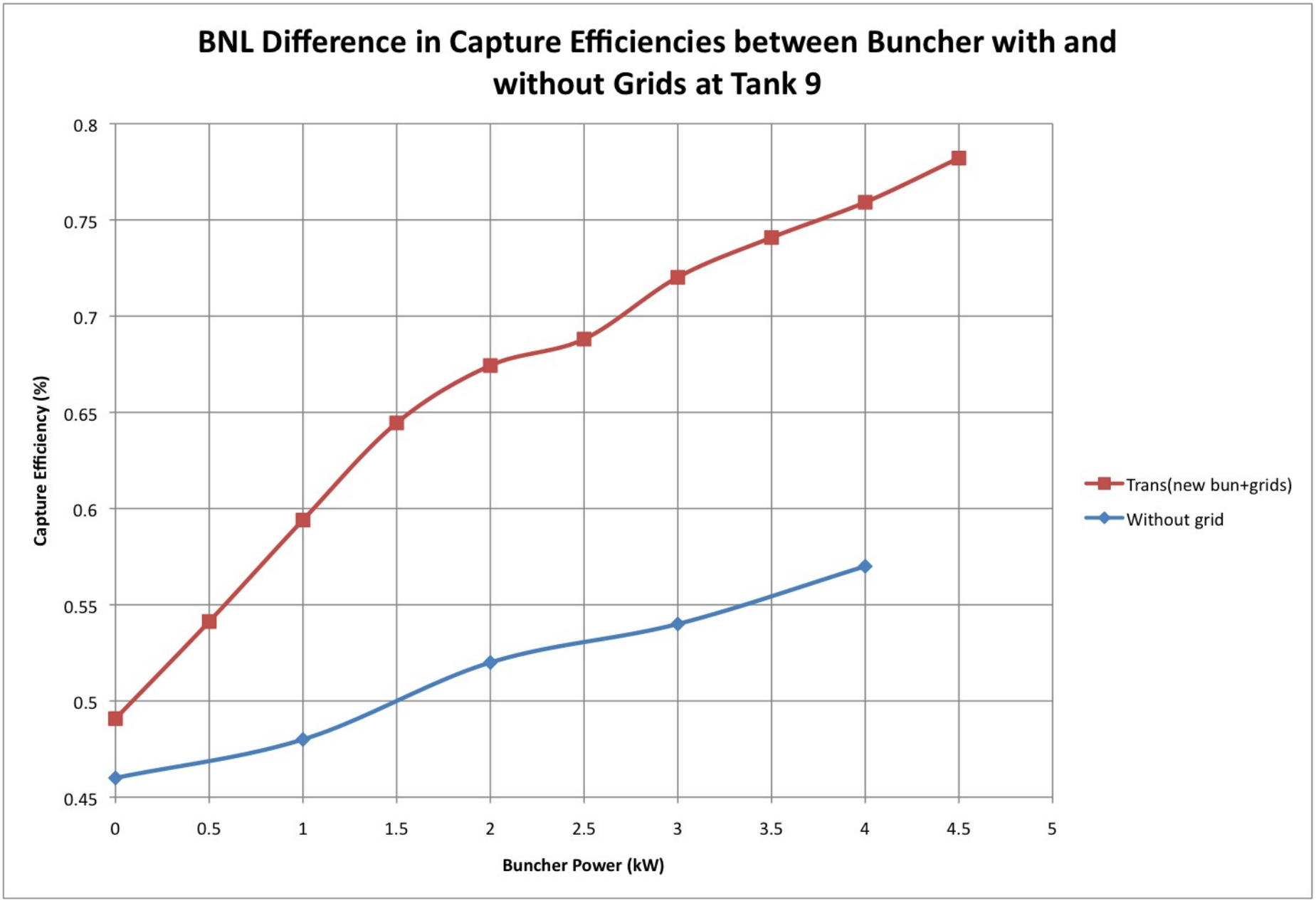


Device	Status	Comments
Einzel lens	Drawings complete.	All parts except bellows are here.
Solenoid PS	Steve Hays has 2	Need to put in inductive feedback loop.
Solenoids	Still being built	See next slide.
LEBT drawings	Being drawn	Complete?
Correctors	final design (07 Mar 2011)	Milhouse still working on drawings.
Vacuum pumps		Order pending

Solenoid status

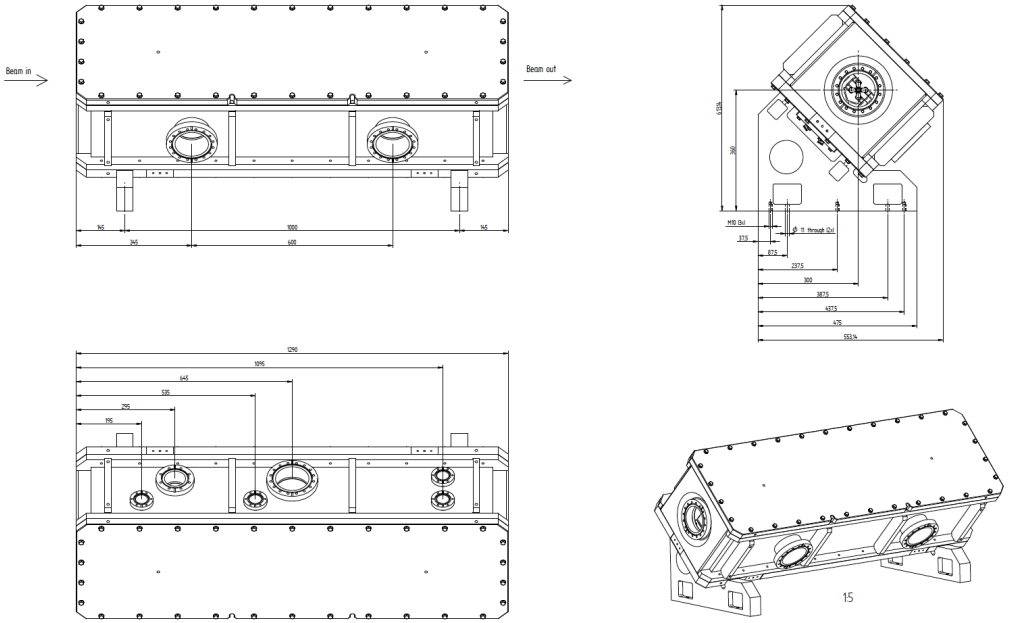
- #1 fiducials added. Stretch wire measurements and Hall probe measurements this week.
- #2 is potted.
- #3 will be potted this week.
- #4 waiting for parts.

Capture Efficiency Data for Buncher



RFQ Status

No news



Device	Status	Comments
4816 PA	spigots added to I- line. power outlets done	done as of 1st week of march

http://www.firma-kress.de/downloads/Accelarator%20Technology%20update.pdf

Kreß GmbH
Sondermaschinenbau

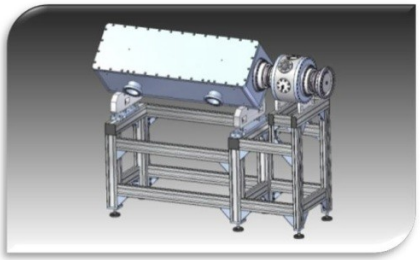
Radio Frequency Quadrupole RFQ accelerator for *Med*Austron, Vienna

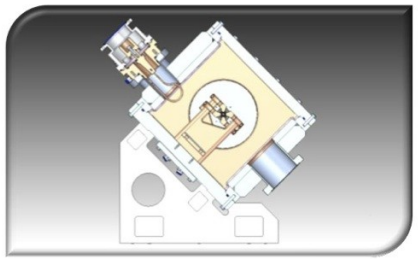
- **First RFQ for medical application with new design.**
- **Cavity with rectangular cross section for easy assembly, access and allignment**
- **RFQ-accelerator and Buncher separated for independent operation**

Technical Data:

Cavity made of stainless steel 304L, inner surface copper plated. Accelerating structure made of OF-Cu.

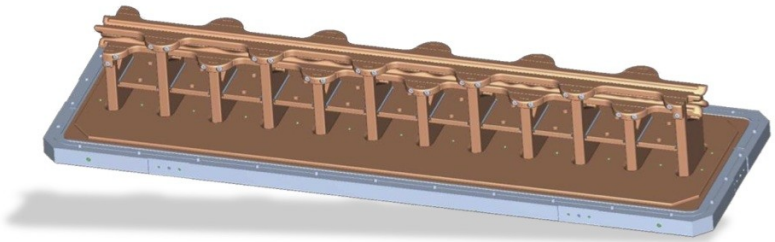
Length	1330 mm
Cross section	420 x 380 mm
Resonance frequency	216,8 MHz
Electrode voltage	70 kV
Input energy	8 keV/u
Output energy	400 keV/u





Designwork for the RFQ is completed and manufacturing will start soon.

For more information visit the *Med*Austron Homepage: www.medaustron.at



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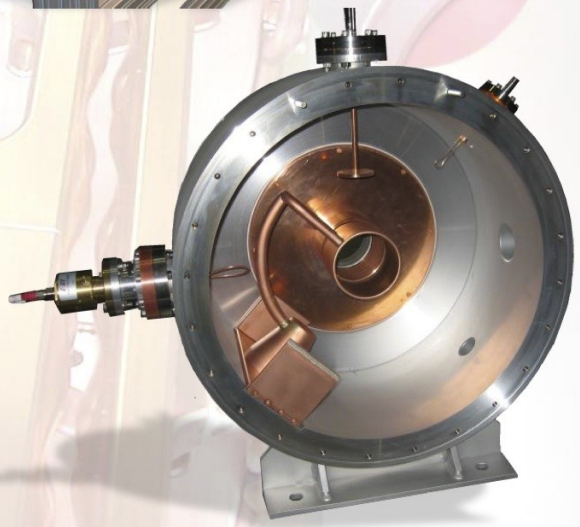
Accelerator Technology



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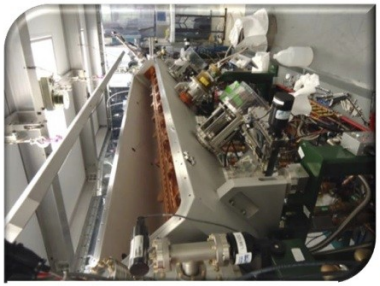
Sondermaschinenbau

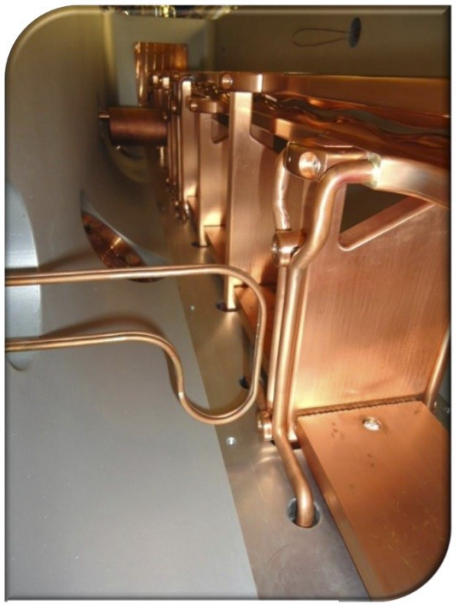
Radio Frequency Quadrupole (RFQ) accelerator for the NSCL at Michigan State University MSU, USA.

The RFQ accelerator shown below is the first "4-Rod Type-RFQ" with a housing made of aluminum with a rectangular cross section. The tank is manufactured from one aluminum block and the inner accelerating structure is made of OF-copper. All stainless steel CF-flanges are welded to the aluminum tank. Due to the new design concept a subsequent adjustment of the electrodes is not necessary. Time consuming and costly copper plating of the cavity is not required.
Together with the Institute of Applied Physics (IAP) and the Michigan State University, special planning and manufacturing processes have been developed in order to reduce the manufacturing time to 9 months. Up to now it took 24 months from the design to the final delivery of a CW operating RFQ accelerator.



Setup at NSCL

Cooling pipes with Swagelok fittings



Accelerating structure with rf-coupler

Technical Data:

Dimensions	3500mm / 500 mm / 500 mm	Resonance frequency	80,5 MHz
Cavity material	Aluminum	Electrode voltage	86,2 kV
Accelerating structure	OF-Cu	Input energy	12 keV/u
Flanges	Conflat (CF Al/SS)	Output energy	600 keV/u
CF-flange sealing	Copper gasket	Shuntimpedance	220 kΩm
Cover plate sealing	2 x Viton O-ring	RF-power	120 kW (CW)

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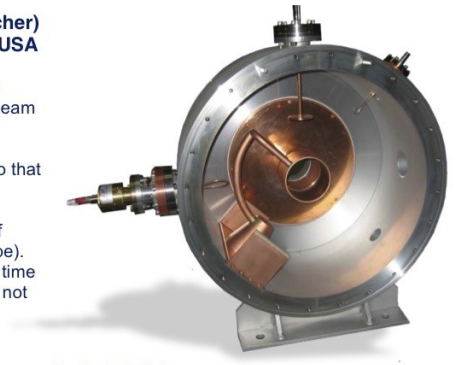
Spiral loaded buncher cavity (BNL_C3-Buncher) for Brookhaven National Laboratory (BNL), USA

The spiral loaded cavity shown below operates as a buncher behind a 4-rod RFQ at BNL. The particle beam coming from the RFQ has to be longitudinally compressed before it can be injected into the next accelerator. This longitudinal focusing is required so that all ions of a particle pulse will be accepted from the following accelerator.
The cavity is manufactured from a massive block of aluminum and all flanges are conflat flanges (CF-type). The accelerating structure is made of OF-copper. A time consuming and costly copper plating of the cavity is not required.



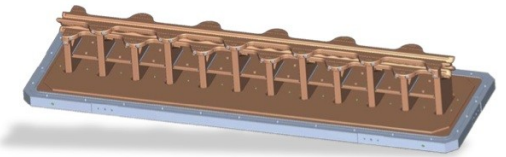
Technical Data:

Length	200 mm
Inner / outer diameter	500 mm / 600 mm
Resonance frequency	100,6 MHz
Flanges	Conflat (CF-type)
End plate sealing	Viton+Helicoflex

Radio Frequency Quadrupole (RFQ) proton accelerator for FERMILAB FNAL, USA.

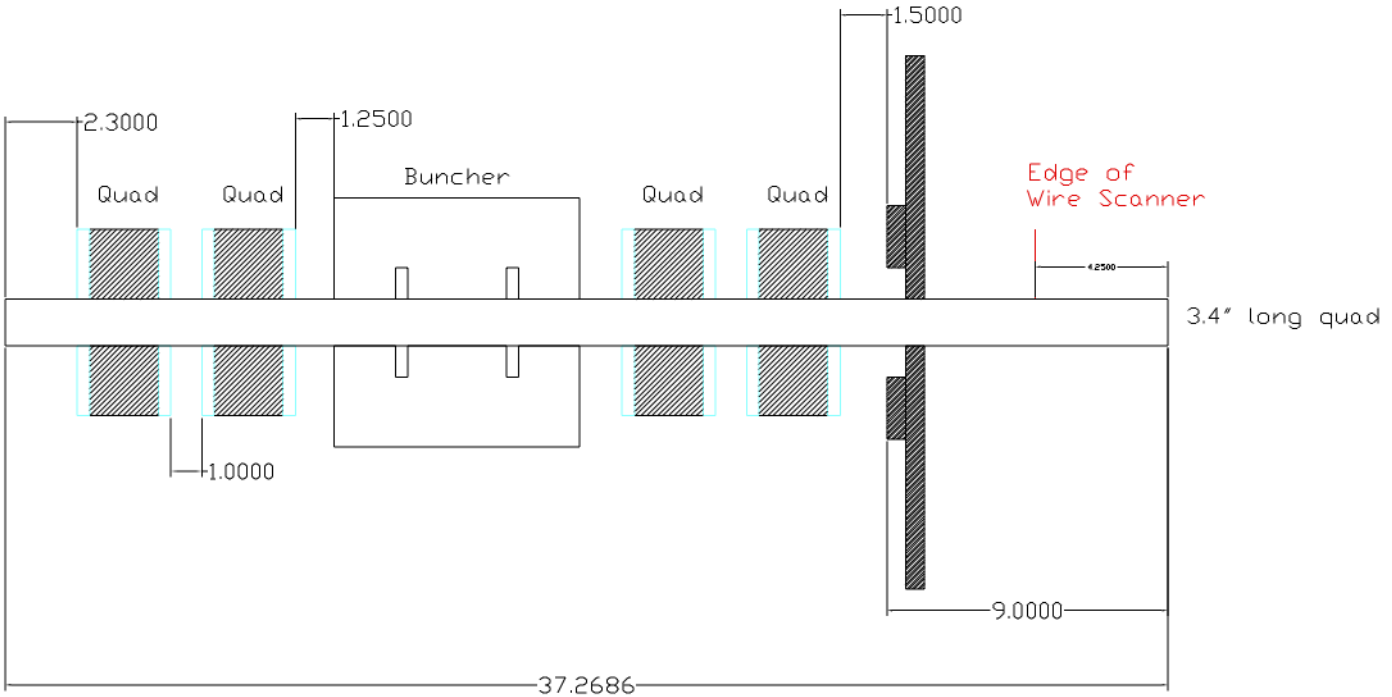
Technical Data:

Cavity made of stainless steel 304L, inner surface copper plated. Accelerating structure made of OF-Cu.



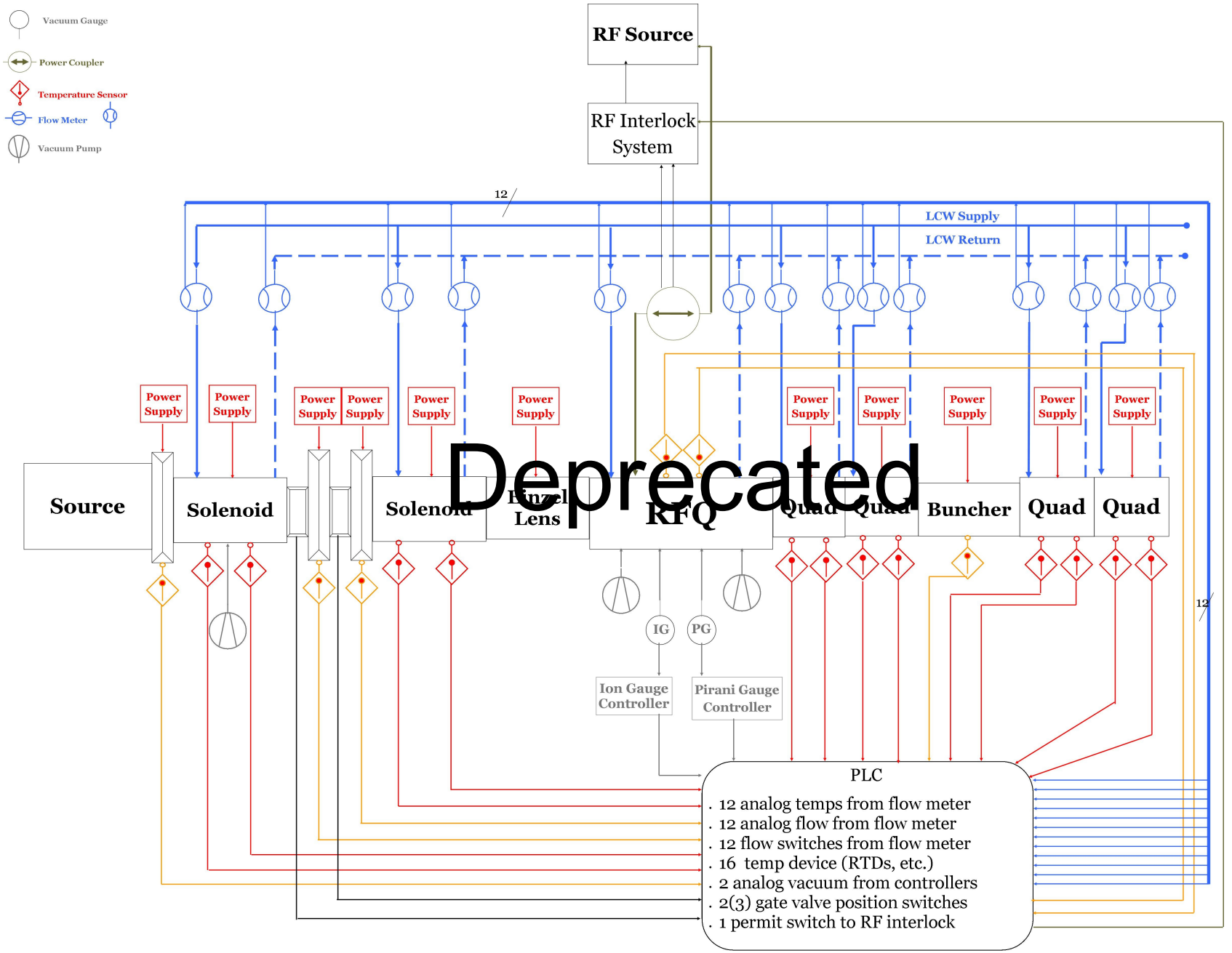
Length	1200 mm
Cross section	300 x 260 mm
Resonance frequency	201,25 MHz
Electrode voltage	76,2 kV
Input energy	35 keV/u
Output energy	750 keV/u

MEBT Status



Device	Status	Comments
Quads	3D drawings complete.	To be distributed. Expected receive parts starting in July. Windings can proceed in parallel.
Buncher	Waiting for bead pull station	Bead pull station being set up. No grids in buncher, resonance at about 203MHz, Q~2000 (c.f. 3500)
Power for quads	Specs to follow	Quads being redone.
Power for buncher		Use present buncher supply in the line.

Controls



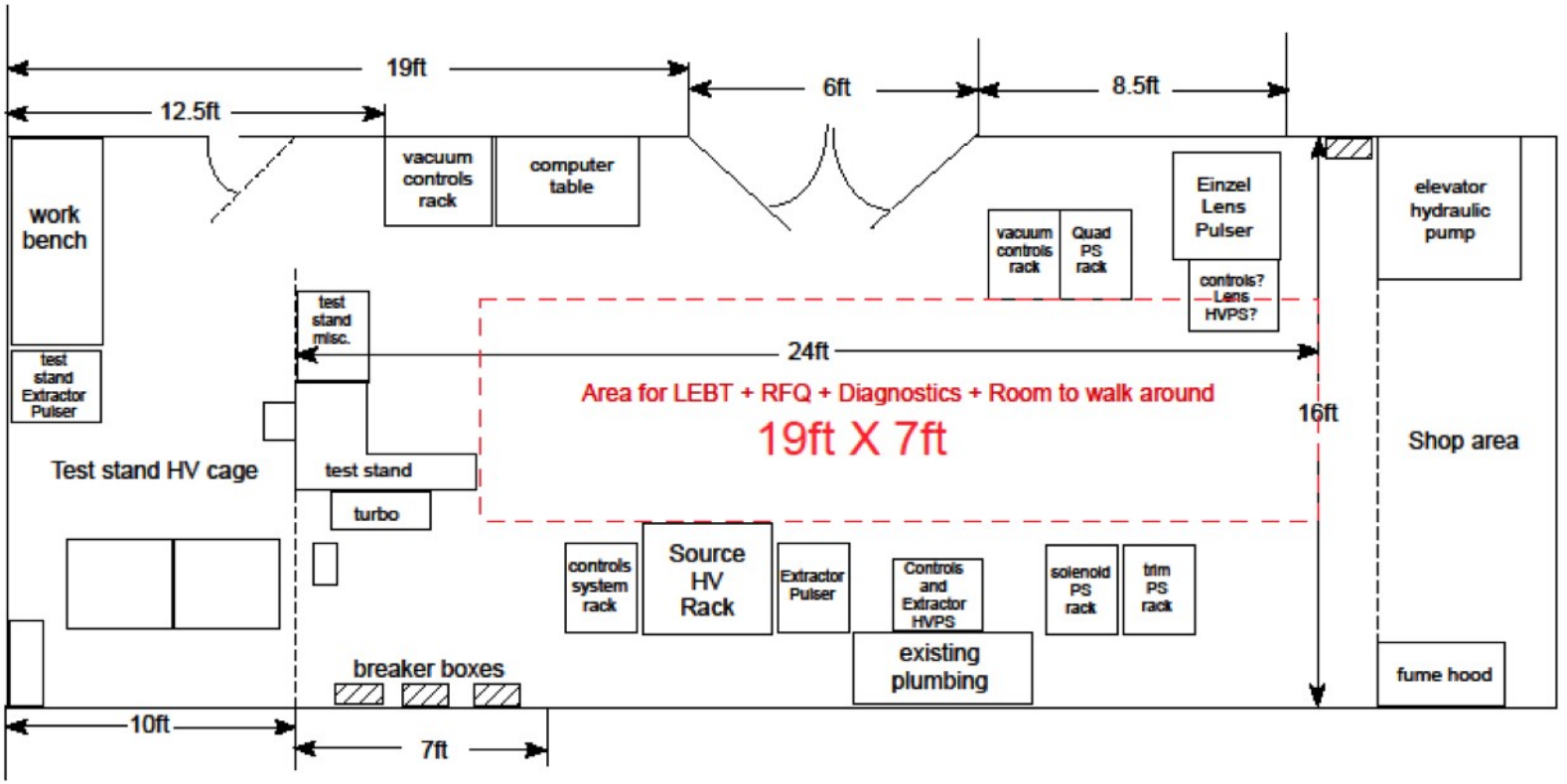
Deprecated

Controls

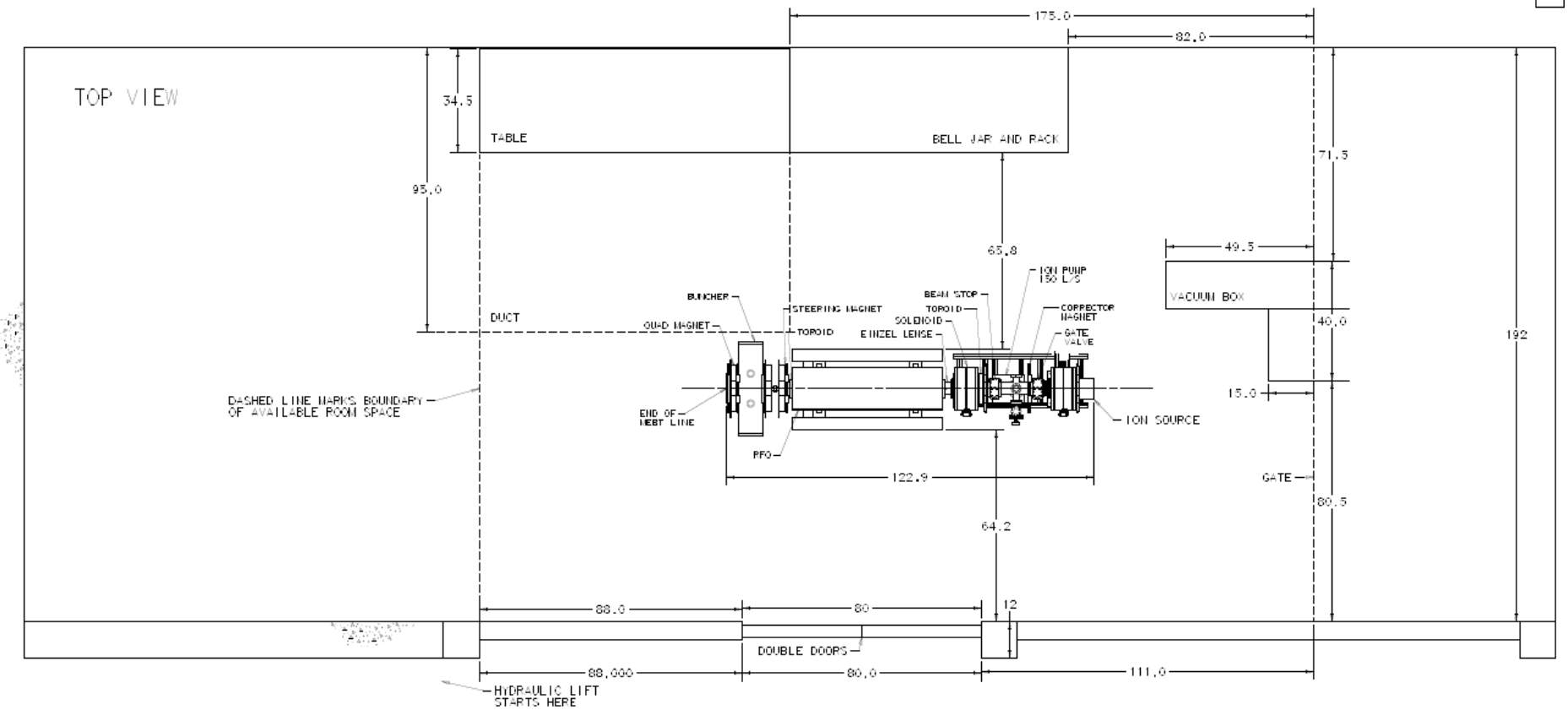
- Controls meeting (06 Apr 2011)
  - See Elmie's summary
  - Need 9 racks
    - 1 rack for solenoids
    - 1 rack for trims
    - 1 rack for controls
    - 1 rack for quads
    - 3 racks for pulser extractor
    - 1 rack for vacuum
    - 1 rack for safety

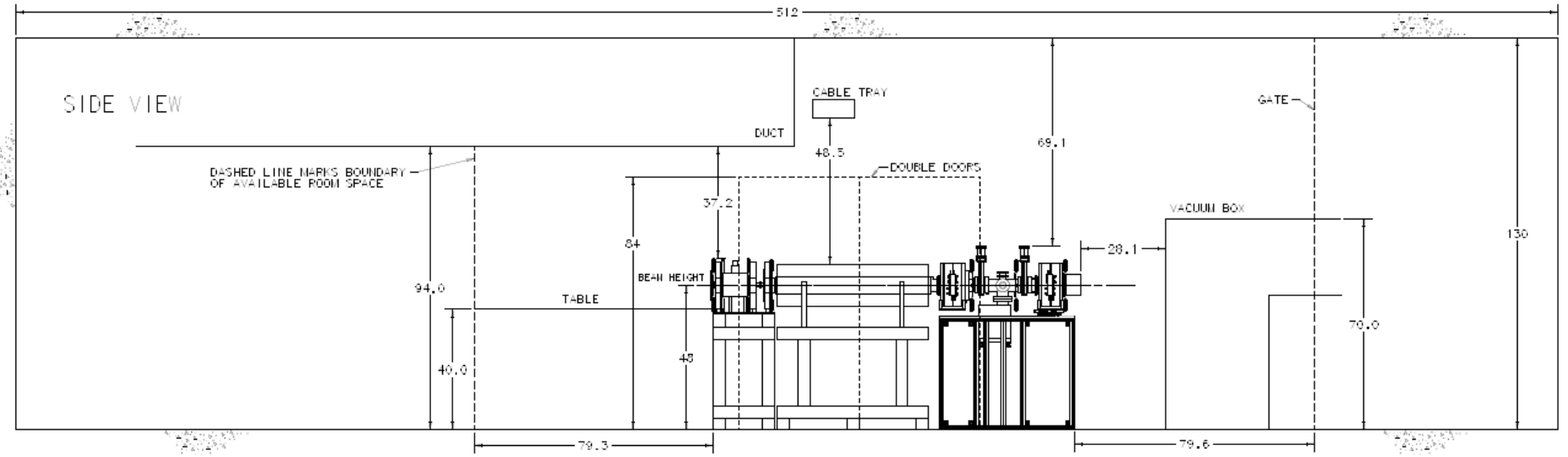
Test Area

Dan is putting in required racks



REV


TOP VIEW
175.0
82.0
34.5
TABLE
BELL JAR AND RACK
71.5
93.0
65.8
49.5
ION PUMP
150 L/S
VACUUM BOX
BUNCHER
STEERING MAGNET
BEAM STOP
CORRECTOR
MAGNET
DUCT
QUAD MAGNET
TOROID
SOLENOID
TOROID
EINZEL LENSE
GATE
VALVE
40.0
192
DASHED LINE MARKS BOUNDARY
OF AVAILABLE ROOM SPACE
15.0
END OF
MEBT LINE
ION SOURCE
RFQ
122.9
GATE
80.5
64.2
88.0
80
12
DOUBLE DOORS
88.000
80.0
111.0
HYDRAULIC LIFT
STARTS HERE


512
SIDE VIEW
CABLE TRAY
GATE
DUCT
48.5
69.1
DASHED LINE MARKS BOUNDARY
OF AVAILABLE ROOM SPACE
DOUBLE DOORS
37.2
VACUUM BOX
84
28.1
130
BEAM HEIGHT
94.0
TABLE
70.0
45
40.0
79.3
79.6

Safety

- When can the beam line layout in test area be done?

RFQ reminders

- Schempp is vendor
  - Make sure that the vanes are cleaned! See ISIS email.
    - Some cleaning details supplied by ISIS.
  - Review and verify on site mechanical design and construction (already in contract).